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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA - 13971 (July 2003)
NASA - KSC
Superseding NASA-13971 (June 2001)

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DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13971

WET CHEMICAL FIRE EXTINGUISHING SYSTEMS

07/03

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SECTION 13971

WET CHEMICAL FIRE EXTINGUISHING SYSTEMS
07/03

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This guide specification covers the requirements for pre-engineered wet chemical fire extinguishing systems for protection of cooking equipment including exhaust hoods, ducts, and related work. System requirements shall conform to NFPA 17A, "Wet Chemical Extinguishing Systems."

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NOTE: Drawings shall not indicate locations of piping, fusible links, or discharge nozzles; Project drawings should indicate the following information:

1. Location and detail of each hood, plenum, and duct to be protected.

2. Location, type, height, and size of each cooking appliance to be protected.

3. Location of fire alarm panel.

4. Method of electrical or fuel shut-off, such as shunt trip breakers or extinguishing system operated solenoid valves. NFPA 96 requires that the electrical power and fuel to all protected appliances be shut off upon actuation of the extinguishing system. Additionally, any gas appliance under the same hood as protected appliances must be shut off. NFPA 96 requires the shut off equipment be of the type that requires manual resetting prior to the fuel or power being restored. This includes power outages.

5. Location of remote manual actuation stations.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

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The publications listed below form a part of this specification to the extent referenced:

ASTM INTERNATIONAL (ASTM)

ASTM A 53/A 53M	(2001) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 106	(1999 e1) Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service

FM GLOBAL (FM)

FM P7825	(2003) Approval Guide

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 17A	(2002; Errata 1994) Wet Chemical Extinguishing Systems
NFPA 70	(2002) National Electrical Code
NFPA 72	(2002) National Fire Alarm Code
NFPA 96	(2001) Ventilation Control and Fire Protection of Commercial Cooking Operations

NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET)

NICET 1032-12	(2003; 2nd Ed) Program Detail Manual Special Hazards Suppression Systems

UNDERWRITERS LABORATORIES (UL)

UL FPED	(2003) Fire Protection Equipment Directory
UL 300	(1996) Fire Testing of Fire Extinguishing Systems for Protection of Restaurant

1.2 SYSTEM REQUIREMENTS

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NOTE: If Section 15003, "General Mechanical Provisions" is not included in the project specification, applicable requirements therefrom should be inserted and the following paragraph deleted.

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Section 15003, GENERAL MECHANICAL PROVISIONS applies to work specified in this section.

1.2.1 Design Requirements

Provide new [and] [modify existing] pre-engineered wet chemical fire extinguishing system for protection of new [and] [existing] cooking equipment including exhaust hoods, ducts, and related work. Equipment, materials, installation, workmanship, inspection, and testing shall be in strict accordance with the required and advisory provisions of the manufacturer's installation manual and NFPA 17A and NFPA 96, except as modified herein. Each system shall include materials, accessories, and equipment necessary to provide each system complete and ready for use. Provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed working drawings to be submitted for approval. Devices and equipment for fire protection service shall be UL FPED listed or FM P7825 approved for use with wet chemical fire extinguishing systems and meet the requirements of UL 300. In the NFPA publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears; reference to the "authority having jurisdiction" shall be interpreted to mean the Kennedy Space Center, Fire Protection Engineer.

1.2.2 Detail Drawings

Submit electrical wiring diagrams and dimensioned or scaled piping layout showing components, pipe sizes, manual activation stations pipe lengths, nozzles, electrical power and gas isolation devices, and valve locations in relation to cooking appliances and fusible link locations.

1.3 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330, "Submittals", and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal

description.
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Submit the following in accordance with Section 01330, SUBMITTALS, in sufficient detail to show full compliance with the specification.

SD-02 Shop Drawings

Detailed computer generated drawings in DWG or DGN format of the pre-engineered wet chemical fire extinguishing system shall be submitted. Details shall include electrical wiring diagrams, and dimensioned or scaled isometric piping layout showing components, pipe size, pipe lengths, nozzles and valve locations in relation to cooking appliances and fusible link locations shall be submitted for approval.

Factory Installation Drawings for approval ten days prior to start of installation.

As-Built computer generated drawings shall be submitted for approval ten (10) days prior to the acceptance testing phase of the project, as described in the paragraph entitled, "Formal Tests and Inspection" of this specification section.

.DXF or .DWG format computer generated shop drawings, schematics and As-Built drawings shall be submitted.

SD-03 Product Data

Manufacturers Catalog Data shall be submitted for the following items:

Agent
Storage cylinder
Fusible links
Regulator
Electrical equipment and gas line shut-off devices
Release mechanisms
Blow-off caps
Discharge nozzle
Piping and fittings
Manual actuators
Remote manual pull stations
Pressure switches
Manufacturer's Installation Manuals
Pulley elbows

SD-06 Test Reports

Provide testing of the system in accordance with paragraph entitled, "Field Quality Control".

Contractor shall prepare a Test Procedure and Test Record Forms for conducting and recording complete test on the suppression

system in accordance with manufacturer's requirements and these specifications. contractor shall submit for approval the test procedure to the Contracting Officer at least 30 days prior to the preliminary system test described in the paragraph entitled "Field Testing" of this specification section. Test procedure shall identify the initial condition. Each step or function in the test, required test results, and shall be provided for recording test results on all equipment devices, and wiring to be tested. Test record forms will also have identified spaces for verification signature of official witnesses and dates of the test.

SD-07 Certificates

Qualifications of installer

SD-08 Manufacturer's Instructions

Fire extinguishing system

Submit the extinguishing system manufacturer's installation manual.

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

1.4 ELECTRICAL WORK

Associated with this section shall be provided under Section 16145, STANDARD WIRING SYSTEMS, except for control [and fire alarm] wiring. [Fire alarm system is specified in Section 13850, FIRE-ALARM AND DETECTION SYSTEMS.] Provide control [and fire alarm wiring] , [including connections to fire alarm systems,] under this section in accordance with NFPA 70 and NFPA 72. Provide wiring in rigid metal conduit or intermediate metal conduit, except electrical metallic tubing conduit may be provided in dry locations not enclosed in concrete or where not subject to mechanical damage.

1.5 QUALITY ASSURANCE

1.5.1 Qualifications of Installer

Qualifications of System Technician: Installation drawings, shop drawing and as-built drawings shall be prepared, by or under the supervision of, an individual who is experienced with the types of works specified herein, and is currently certified by the National Institute for Certification in Engineering Technologies (NICET 1032-12) as an engineering technician with minimum Level-III certification in Special Hazard System program. Contractor shall submit data for approval showing the name and certification of all involved individuals with such qualifications at or prior to submittal of drawings.

As-built drawings shall be submitted for approval 21 days prior to the acceptance testing phase of the project as described in the paragraph entitled, "Format Tests and Inspections," of this specification. Two (2)

sets of magnetic media and hard copies of all new and revised software and drawings shall be provided with the submittal. As-built drawings shall document final system configuration including deviations from and amendments to the drawings, and field installation changes, concealed and visible.

1.5.2 Components

Components used in the installation shall not be more than one year old.

Devices and equipment for fire protection service shall be UL FPED or FM P7825 approved for their intended use and function.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver, store, protect, and handle products to site in such a manner as to prevent damage caused by dirt, debris, and weather. Storage of materials shall not impact safety or work operations in areas adjacent to the storage site.

Deliver materials to the job site in sealed, original containers, each bearing the manufacturer's labels.

Materials arrived at the site without labels, opened, damaged, or containing less material than specified shall not be accepted for use.

Materials shall be stored in a well ventilated area at temperatures not exceeding 130 degrees F 54.4 degrees C or less than 32 degrees F 0 degrees C.

PART 2 PRODUCTS

2.1 PREENGINEERED WET CHEMICAL FIRE EXTINGUISHING SYSTEMS

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NOTE: If the piping between hood and storage canisters is mounted

against....	**specify**
A porous surface (gypsum wallboard, etc.) that has a painted enamel	**Galvanized malleable iron, or galvanized steel**
A stainless steel wall plate or other nonporous, prefinished surface	**Chrome plated or stainless steel**

Galvanized pipe and fittings are not permitted for use with wet chemical extinguishing systems.

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Systems shall comply with NFPA 17A and NFPA 96, except as modified herein. Piping and accessories within the hood shall be Schedule 40 stainless steel or chrome plated. All other piping shall be [Schedule 40 galvanized

malleable iron or galvanized steel, painted to match the adjacent surface][chrome plated or stainless steel]. Exhaust hoods with grease extractors UL FPED listed or FM P7825 approved are not required to have protection downstream of the grease extractors. Wet chemical agent shall be listed for the particular system and recommended by the manufacturer of the system. Provide systems for protection of new [and] [existing] cooking equipment, including exhaust hoods and ducts for cooking equipment requiring protection by NFPA 96.

All system components shall be UL 300 listed as part of the manufacturer's UL approved, integrated fire suppression system. Systems shall be installed within their maximum and minimum piping and temperature limitations as established by testing laboratories, and as published in the manufacturers installation manual, to comply with their UL 300 listing.

2.2 SYSTEM CONTROLS

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NOTE: If there is no building fire alarm system, provision for connection to the base fire alarm system should be included in a separate specification section. Refer to Section 13852, "Interior Fire Alarm System."

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Each system shall be mechanically actuated by fusible links and by remote manual actuation stations connected to the extinguishing system release mechanisms by stainless steel cables. Arrange each system to automatically shut off the flow of fuel and electrical power to cooking appliances as indicated automatically, shutdown makeup air units is provided, and to automatically actuate the building fire alarm system as indicated. Gas valves shall be UL listed and be of the manual mechanical reset type. Electrical power to hood exhaust fans shall not be shut off unless specifically required by the UL FPED listing or FM P7825 approval. Provide operating instructions at all system remote manual actuation stations.

2.3 [EXISTING]BUILDING FIRE ALARM CONTROL PANEL

Discharge of the extinguishing system shall actuate the fire alarm control panel in the same manner as other actuating devices in accordance with NFPA 72. Extinguishing system wiring shall be supervised in the same manner as other devices connected to the fire alarm system. [Refer to Section 13850, FIRE-ALARM AND DETECTION SYSTEMS, for related requirements.]

2.4 COMPONENTS

The basic wet chemical suppression system shall consist of a regulated release assembly, which includes a regulated release mechanism and a wet chemical storage cylinder housed within a single enclosure. Piping, fittings, discharge nozzles, blow-off caps, cartridges, agent, fusible links, and pulley elbows. Additional equipment shall include remote manual pull stations, mechanical gas valves, pressure switches, and electrical switches for automatic electrical equipment and gas line shut-off devices.

Manual Actuators: Manual actuators shall not require a force of more than 40 lbs 18.1 kilograms or a movement of more than 14 inches 355 millimeter to secure operation. All manual actuators shall be provided with operating instructions. These instructions shall be permitted to include the use of pictographs and shall have lettering at least 1/4 inch 6.35 millimeter in height. All remote manual operating devices shall be identified as to the hazard they protect.

Electric Dual Snap-Action Switch: Provide UL listed electric dual snap-action switch(s). All electrical connections to the snap action switch wiring harness shall be made in junction boxes mounted adjacent to the stainless steel enclosure for the wet chemical suppression system.

Distribution Piping: Distribution piping shall be Schedule 40 black iron, chrome-plated or stainless steel pipe conforming to ASTM A 53/A 53M, or ASTM A 106.

Wet Chemical Agent: The extinguishing agent shall be a potassium carbonate, potassium acetate-base formulation designed for flame knockdown and securement of grease-related fires. The agent shall be available in plastic container, labeled with handling and usage instructions.

Agent Tank: The agent tank shall be installed in a stainless steel enclosure. The tank shall be constructed of deep drawn carbon steel, finished in red enamel, 1.5 gallon or 3.0 gallon 5.7 liter or 11.4 liter in size, as required by manufacturer's design. Tanks shall have 100 psi 689 kilopascal working pressure, 300 psi 2068 kilopascal minimum burst pressure.

Tank Adaptor: Tank adaptor assembly shall be chrome-plated steel with a (1/4 inch 6.35 millimeter) NPT female inlet and a (3/4 inch 19 millimeter), NPT male outlet.

Regulated Release Mechanism: Spring-loaded mechanical/fusible link pneumatic type regulator capable of providing expellant gas supply to agent tank(s). It shall contain a factory installed regulator deadset at 100 psi 689 kilopascal and be compatible with mechanical and electrical gas shut-off devices.

Regulated Actuator Assembly: Provide expellant gas for additional tanks in systems requiring (three) or more tanks. It shall contain a factory installed regulator deadset at 100 psi 689 kilopascal.

Discharge Nozzles: Tested and listed for a specific application, each shall be stamped with flow designation and tip part number. Each nozzle shall be quipped with a protective cap to keep the nozzle tip orifice free if cooking grease build-up.

2.5 IDENTIFICATION SIGNS

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NOTE: Locate remote manual actuation stations in the normal path of egress and at least 1.50 meters(5 feet) from the protected cooking appliances. Avoid grouping stations for different systems

together; however, when this is not possible, include identification signs.

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Provide red rigid plastic signs with engraved 0.25 inch 6.35 millimeter high white lettering at each remote manual actuation station. Sign legends shall be "Fire Extinguishing System" followed by a brief description of the equipment protected.

PART 3 EXECUTION

3.1 INSTALLATION

Equipment, materials, installation, workmanship, inspection, and testing shall be in accordance with the manufacturer's installation manuals and maintenance manuals NFPA 17A, except as modified herein.

3.1.1 Piping

Install piping in accordance with the manufacturers UL listing. Where possible, piping shall be run concealed or otherwise located to minimize the potential of inadvertent damage. Piping shall be installed parallel or perpendicular to the line of buildings and within hoods.

All piping, fittings, and connections shall be sealed with pipe tape. When applying pipe tape, start on second male thread and wrap the tape (two turns maximum) clockwise around the threads, away from the pipe opening. Do not allow tape to overlap the pipe opening as this could cause possible blockage of the gas pressure.

Piping shall be properly supported to withstand static and dynamic loading. Piping shall be installed to prevent contact of dissimilar metals.

3.2 FIELD QUALITY CONTROL

Perform tests to determine compliance with the specified requirements in the presence of the Contracting Officer. Test, inspect, and approve piping before covering or concealing. Provide Test Procedure and Test Record Forms for approval 21 days prior to formal testing and inspection.

3.2.1 Preliminary Tests

Upon completion and before final acceptance of the work, test each piping and fittings system by discharging a minimum of one storage cylinder of same size as system cylinder of compressed air or nitrogen (do not use wet chemical) to demonstrate the reliability and proper functioning of all pressure switches, electrical and gas shutoff features, and the discharge of gas from each system discharge nozzle. Individually test remote control stations and other components and accessories to demonstrate proper functioning. Testing shall also include automatic and manual actuation, and fuel or electrical power shutoff and automatic actuation of the building fire alarm system. When tests have been completed and corrections made, submit a signed and dated certificate, with a request for formal inspection and tests.

3.2.2 Formal Tests and Inspection

The Contracting Officer will witness formal tests and approve systems before acceptance. Submit As-Built drawings and a written request for formal inspection at least [21][_____] working days prior to inspection date. An experienced technician regularly employed by the system installer shall be present during the inspection. At the inspection, repeat all of the required tests as directed. Provide nitrogen or CO2 and discharge each system to demonstrate uniform distribution of the wet chemical among the nozzles. Furnish nitrogen, or CO2, and personnel for the tests. Refill and reset systems after tests have been completed.

3.3 OPERATION AND MAINTENANCE

Operation and Maintenance Manuals, grouped by technical sections consisting of manufacturer's standard catalog data, as-built schematics, testing and maintenance procedures, recommended spare parts, recommended test equipment, and safety precautions. This information shall be submitted prior to acceptance test being performed.

-- End of Section --